PATENT

Application # 10/667,060

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Applicant(s)	:	Schaftlein, Richard C.
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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. § 1.132

Sir:

I, Dr. Ronald D. Williams, a citizen of the United States, whose full post office address is 1715 Hearthglow Lane, Charlottesville, VA 22901 declare as follows under penalty of perjury.

Background

1. I hold a Ph.D. degree in Electrical Engineering from the Massachusetts Institute of Technology awarded in 1984.
2. I hold a M.S. degree in Electrical Engineering from the University of Virginia

awarded in 1978.

3. I hold a B.S. degree in Electrical Engineering from the University of Virginia awarded in 1977.
4. I am currently an associate professor of Electrical & Computer Engineering at the University of Virginia.
5. Since 1984, I have worked continually in the field of electrical engineering with particular emphasis in embedded computing with applications in control and signal processing.
6. During my career, I have been granted five U.S. patents for my own inventions in the field of embedded computing.

Review

7. I have reviewed Application Serial No. 10/667,060 (hereinafter the present application).
8. I know what a person having ordinary skill in the art of the present application would have known on the priority date claimed by the present application (26 September 2002).
9. I have reviewed the USPTO Office Action dated 11 May 2006 (hereinafter the "Office Action") regarding the present application.
10. I have reviewed U.S. Patent Publication No. 2005/0020924 A1 (Hipp).

11. I have reviewed pages 3, 119, and 297 of the book *REAL-TIME SYSTEMS*, Wolfgang A. Halang, Krzysztof M. Sacha, World Scientific, 1993 ("Halang").

12. I have reviewed page 42 of the book *REAL-TIME SYSTEMS Scheduling, Analysis and Verification*, Albert M.K. Cheng, Wiley Interscience, Aug. 12, 2002 ("Cheng").

13. Among the devices with which I was familiar prior to 26 September 2002, the priority date claimed by the present application, were devices of the types recited in Hipp, Halang, and Cheng.

Lexicography

14. Each of claims 1-31 recites a "programmable logic controller". A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would construe the phrase "programmable logic controller" to mean:

> a solid-state, microprocessor-based, real-time computing system that is used, via a network, to automatically monitor the status of field-connected sensor inputs, and automatically control communicatively-coupled devices of a controlled industrial system (e.g., actuators, solenoids, relays, switches, motor starters, speed drives (e.g., variable frequency drives, silicon-controlled rectifiers, etc.), pilot lights, ignitors, etc.) according to a user-created set of values and user-created logic and/or instructions stored in memory. The sensor inputs reflect measurements and/or status

information related to the controlled industrial system. A PLC provides any of: automated input/output control; switching; counting; arithmetic operations; complex data manipulation; logic; timing; sequencing; communication; data file manipulation; control; relay control; motion control; process control; distributed control; and/or monitoring of processes, manufacturing equipment, and/or other automation of the controlled industrial system. In addition to controlling a process, a PLC might also provide control of information, such as via outputting information to speakers, printers, monitors, displays, indicators, etc., and/or rendering information, such as via reports, notifications, and/or alarms, etc., such as via a Human-Machine Interface (HMI). Because of its precise and real-time timing and sequencing capabilities, a PLC is programmed using ladder logic or some form of structured programming language specified in IEC 61131-3, namely, FBD (Function Block Diagram), LD (Ladder Diagram), ST (Structured Text language), IL (Instruction List) and/or SFC (Sequential Function Chart), or potentially via a general purpose real-time-aware programming language, such as ADA. Because of its real-time timing and sequencing capabilities, a PLC can replace up to thousands of relays and cam timers. PLC hardware often has good redundancy and fail-over capabilities.

15. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would have found implicit support in the present application for this definition at least at paragraph 0005 of the published version of the present application (U.S. Patent Publication No. 20040117537).

16. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would have found support for the definition of paragraph 14 in prior art publications. For example, support for the definition of paragraph 14 can be found in Halang at least at pages 3 and 297.

17. Each of claims 2, 3, 5, 12, 15, and 23-25, recites the phrase "real-time". A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would construe the phrase "real-time" to mean:

> relating to a system (or sub-system) having activities with hard deadlines, and a sequencing goal of always meeting all those hard deadlines. A system operating in non-real-time can suffer a critical failure if time constraints are violated. A classic example of a real-time computing system is an automobile engine electronic valve timing control system, in which an overly delayed or overly advanced control signal might cause engine failure or damage, due to one or more valve-piston collisions. Systems operating in real-time typically utilize instructions embedded in hardware and/or firmware.

18. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would have found implicit support in the present application for this definition at least at paragraph 0008 of the published version of the present application (U.S. Patent Publication No. 20040117537).

19. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would have found support for the definition of paragraph 17 in prior art publications. For example, support for the definition of paragraph 17 can be found in Halang at least at page 3 and in Cheng at least at page 42.

20. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would have understood the phrase "hard deadline" comprised in the definition of "real-time" (see paragraph 17, *supra*) to mean:

> a special case where completing an activity within the deadline results in a system receiving all the utility possible from that activity, and completing the activity outside of the deadline results in zero utility (i.e., resources consumed by the activity were wasted, such as when one travels to the beach to photograph a sunrise on a particular day and arrives after the sun has already arisen) or some negative value of utility (i.e., the activity was counter-productive, such as when firefighters enter a burning building to search for a missing person seconds before the building collapses, resulting in injury or death to the firefighters). The scheduling criteria for

a hard deadline is to always meet the hard deadline, even if it means changing the activity to do so.

21. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would have found support for the definition of paragraph 20 in prior art publications. For example, support for the definition of paragraph 20 can be found in Halang at least at page 3.

22. Claim 4 recites the phrase "deterministic". A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would construe the phrase "deterministic" to mean adapted to process information and/or control a process in real-time.

23. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would have found implicit support in the present application for this definition at least at paragraph 0023 of the published version of the present application (U.S. Patent Publication No. 20040117537).

24. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would have found support for the definition of paragraph 22 in prior art publications. For example, support for the definition of paragraph 22 can be found in Halang at least at pages 3 and 119.

Hipp Does Not Teach a "Programmable Logic Controller"

25. Each of pending claims 1-31 of the present application recites a "programmable logic controller."

26. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would not have found that Hipp teaches a "programmable logic controller."

27. Instead, a person skilled in the art would have found that a portion of Hipp allegedly recites "computers in a computer network." See paragraph 0002.

28. Thus, a person skilled in the art would not have found that Hipp teaches a "programmable logic controller."

Hipp Does Not Teach a "Real-Time Operating Environment"

29. Each of pending claims 2, 3, 23 of the present application recites a "real-time operating environment."

30. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would not have found that Hipp teaches a "real-time operating environment."

31. Instead, a person skilled in the art would have found that a portion of Hipp merely recites a "virtual environment." See FIG. 3.

32. Thus, a person skilled in the art would not have found that Hipp teaches a "real-time

operating environment."

Hipp Does Not Teach a "Real-Time Operating mode"

33. Pending claim 15 of the present application recites a "real-time operating mode."

34. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would not have found that Hipp teaches a "real-time operating mode."

35. Instead, a person skilled in the art would have found that a portion of Hipp merely recites a "virtual environment." See FIG. 3.

36. Thus, a person skilled in the art would not have found that Hipp teaches a "real-time operating mode."

Hipp Does Not Teach a "Real-Time Device Driver"

37. Each of pending claims 5, 24, 25 of the present application recites a "real-time device driver."

38. The present Office Action asserts, at Page 4, that "Hipp teaches that the installing step includes installing a real-time device driver (Fig. 2; 220, Fig. 4; p. 5, ¶ 0049).

39. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would have found the assertion quoted in paragraph 38 to be factually erroneous.

40. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would not have found that Hipp teaches a "real-time device driver."
41. Instead, a person having ordinary skill in the art would have interpreted the phrase "real-time" to have the meaning recited in paragraph 17
42. A person skilled in the art would not have found that Hipp teaches a "real-time device driver."

Hipp Does Not Teach a "Deterministic Operating Environment"

43. Pending claim 4 of the present application recites a "deterministic operating environment."
44. A person having ordinary skill in the art as of 26 September 2002, the priority date of the present application, would not have found that Hipp teaches a "deterministic operating environment."
45. Instead, a person skilled in the art would have found that a portion of Hipp merely recites a "application process." See FIG. 11.
46. Thus, a person skilled in the art would not have found that Hipp teaches a "deterministic operating environment."

I further declare that all statements made herein of my own knowledge are true and that these

statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 4th day of August 2006

Dr. Ronald D. Williams